



# Buildings for the 21st Century

Summer 2000

News You Can Use

Office of Building  
Technology, State and  
Community Programs

## Earth Day 2000 Clean Energy Now!

On April 22, thousands of people walked away with a "clean energy" education after visiting the EnergySmart Schools classroom exhibit at the Earth Day celebration on the National Mall in Washington, D.C.

Visitors tested their clean energy know-how with a pop quiz, studied tips for saving energy, observed how some appliances continue to use electricity even when they're turned off, learned about the benefits of energy-efficient windows and ENERGY STAR® computers, and much more. Many even took home free, energy-efficient compact fluorescent light bulbs.

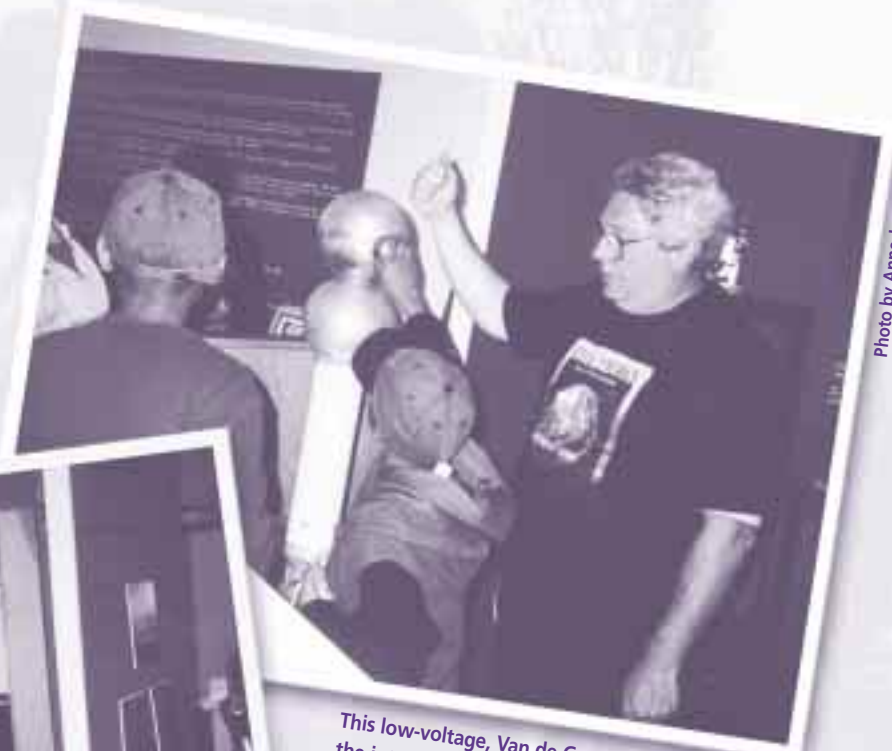
People also experienced first-hand the power of clean and renewable energy. All the exhibit tents at the celebration were powered by clean energy technologies developed by DOE. While visiting the classroom exhibit tent, people learned that it was being powered by a 0.9-kilowatt photovoltaic array, eight 0.3 kilowatt wind generators and a 180-kilowatt reciprocating engine.

The exhibit's display of commercially available energy-efficient and renewable energy technologies was a showcase for the Earth Day 2000 theme, "Clean Energy Now!"



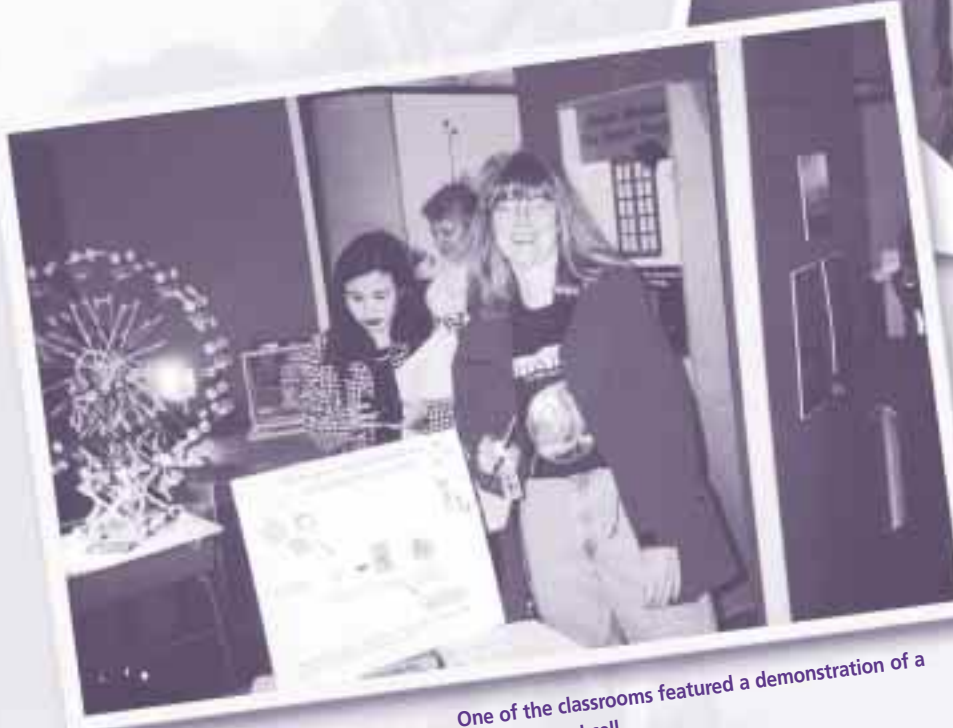
Many people showed up for the Earth Day celebration despite the cold and rainy weather.

Photo by Anne Jones, NREL



This low-voltage, Van de Graaff generator sparked the interest of many visitors.

Photo by Anne Jones, NREL



One of the classrooms featured a demonstration of a hydrogen fuel cell.

Photo by Larry Goldberg,  
NCI Information Services, Inc.

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The Southface Center features more than 100 sustainable technologies.

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Rebuild America celebrates its 250th partnership.

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Learn about some of the cooling technologies BTS is developing and marketing.

# Lighting and Window Industries Prepare for the Future

This spring BTS released two building technology roadmaps—one for lighting and another for windows. Developed with industry partners, the roadmaps serve as guides for the cooperative efforts among researchers, government and private companies for the next 20 years, navigating the future course for the research, development and marketing of new technologies.

## Vision 2020: The Lighting Technology Roadmap

The Lighting Technology Roadmap responds to the significant changes underway in the industry and in commercial building design and management. By 2020, lighting systems should adapt easily to the changing needs of any user. Tomorrow's high-quality lighting will improve employee productivity, aid in retention and work quality, and provide more effective use of space. The systems of the future will also minimize maintenance and energy costs, and provide consumers with comfort, convenience and reliability.

The roadmap addresses potential barriers to meeting future challenges. The overriding market-related barrier is the lack of a strong business case for advanced lighting systems that can drive end-user demand. Technology barriers include a lack of standardization, the need for more sophisticated control capabilities, the need for better evaluation of products and technologies, and the need for higher-efficiency lighting sources.

More than 200 stakeholders from 175 lighting industry organizations cast their votes in the selection of the following strategies for overcoming these barriers:

- Develop clear definitions and standards for lighting quality
- Increase demand for high-quality lighting by demonstrating lifecycle benefits
- Strengthen industry education and credential lighting professionals
- Accelerate the market for advanced lighting systems by providing R&D incentives and improving specification and distribution methods
- Develop advanced source and ballast technologies
- Develop lighting controls with high levels of intelligence
- Develop luminaries and systems that improve light delivery.

## Window Industry Technology Roadmap

The Window Industry Technology Roadmap is a response to trends in new construction and retrofit of fenestration products—including doors and skylights—with a premium placed on energy conservation, quality, fast delivery and low installation costs. By 2020, consumers should recognize windows as an integral part of a building system. Windows should also provide energy, enhanced comfort, lighting, security, aesthetics and harmony with the natural environment.

BTS industry partners identified several key barriers to industry advances: a lack of educated consumers

and consequent demand for innovative products; inconsistent and poorly enforced building codes; lack of tools to achieve system integration; and an ambiguous definition of durability and the consequent implications for warranties.

The more than 30 stakeholders who helped put the roadmap together selected key fenestration technology areas where advances must be made to attain roadmap goals. Those research areas included imaging, energy production and supply, light transmission, insulation, analytical tools, manufacturing, design and electronics. The objectives selected by the industry forum for overcoming market and policy barriers include:

- Developing communication channels among industry groups
- Developing ways to optimize integrated building systems and to measure their value
- Defining performance metrics
- Establishing a system for rating products based on durability
- Educating stakeholders and end users on long-term cost benefits
- Specifying technology needs as identified by user expectations
- Providing incentives, perhaps through the ENERGY STAR® program.

Visit the BTS Web site at [www.eren.doe.gov/buildings/technology\\_roadmaps/](http://www.eren.doe.gov/buildings/technology_roadmaps/) to view the roadmaps in PDF or for more information on the roadmapping process.

# Southface Provides Lesson in Sustainability

The Southface Energy and Environmental Resource Center in Atlanta, Georgia, may look like a typical upscale, southern home, with its wrap-around porches and airy feeling, but it's not. It's a 6,300 square-foot commercial building that showcases energy-efficient and green building technologies. Since it opened in 1996, more than 20,000 visitors have toured the center to learn more about sustainable buildings.

"Most visitors are initially impressed by the beauty of the building, becoming slowly aware of more than 100 sustainable technologies," said Dennis Creech, director of the Southface Energy Institute.

The Center was designed and constructed through a joint effort between DOE, Oak Ridge National Laboratory, Lawrence Berkeley National Laboratory and Southface, while Pimsler Hoss Architects developed its award-winning look. This project team used a *systems approach* to integrate energy efficiency and renewable energy technologies; environmentally sustainable building materials and techniques; a healthy building design; and handicap accessibility.

The design of the building's shell reduced the amount of natural

resources used by 25 percent. Insulated concrete forms (R-16) contain 10 percent fly ash to reduce the amount of cement needed, and the insulated panels (R-25) contain 25 percent less wood than framing with traditional lumber. Also, water-efficient landscaping and appliances conserve a significant amount of water.

The project team incorporated many energy-saving features into the building as well, including energy-efficient lighting, a passive solar design, a

well-insulated building envelope, ENERGY STAR® appliances, high-performance windows, and a geothermal heat pump. As a result, the building's annual energy usage is reduced by 61,000 kilowatt-hours, preventing more than 91,000 pounds of greenhouse gases each year. Other features—like natural fiber carpets and controlled ventilation—minimize indoor pollutants.

The building's design has been recognized with awards from ENERGY STAR® and professional associations, such as the American Institute of Architects; the American Society of Heating, Refrigerating and Air Conditioning Engineers; and the American Concrete Institute.

In addition to being a model of sustainability, the Center houses offices for Southface staff and rooms for educational programs. In 1999, more than 3,500 people attended Southface-sponsored workshops. Through a partnership between DOE, Southface and Habitat for Humanity International, more than 500 local Habitat affiliates have participated in a program designed to reduce the environmental impact of affordable housing. Numerous regional planning and environmental organizations also meet regularly at the Center, creating a base for those who identify with the Southface mission.

Southface has been providing education, research and technical assistance on sustainable energy and environmental technologies since 1978. For more information, visit its Web site at [www.southface.org](http://www.southface.org) or call 404-872-3549.



Photo courtesy of the Southface Energy Institute

The Southface Energy and Environmental Resource Center has a multitude of sustainable features, including its water-efficient landscaping.

# Rebuild America Reaches Major Milestone

Rebuild America celebrated its 250th partnership—three years ahead of schedule! On February 17, Secretary Bill Richardson personally honored Rebuild Austin as number “250” at a neighborhood block party in the Texas city.

“The Department is extremely pleased and proud to be a partner in Rebuild Austin,” Richardson said. “This effort demonstrates that energy efficiency can be used to revitalize an economically depressed neighborhood so that it can participate in the economic boom that many communities across the nation are enjoying.”

The Rebuild Austin partnership plans to begin work in an East Austin neighborhood located a short distance from the city's thriving business and state government district. It will transform the Ebenezer Baptist Church, an educational center, a daycare center, small businesses, senior housing and low-income housing buildings into models of energy efficiency. One building will be converted into a training center to provide job skills for local residents and new business opportunities for the community. Austin Energy, a local utility and Rebuild Austin partner, has donated a 6-kilowatt roof-mounted photovoltaic panel for the daycare center. MetalOptics has donated about 50 energy-efficient light fixtures, which it manufactures, to the church.

“By working through a church-based neighborhood, Rebuild Austin and DOE are successfully



Photo courtesy of D&R International

(l. to r.) Kathryn Houser of the Sustainable Living Association, Secretary Bill Richardson, Rev. Marvin Griffin of the Ebenezer Baptist Church, and Mark Kaptner of Austin Energy at the Rebuild Austin celebration

addressing community concerns about housing, utility bills and future economic growth,” said I.Q. Hurdle, project director of the East Austin Economic Development Corporation.

Rebuild Austin partners include the Ebenezer Baptist Church; the East Austin Economic Development Corporation; the Austin Department of Housing and Neighborhood Services; Austin

Energy; the American Council for an Energy-Efficient Economy; Texas A&M University, Liberty Bank; the Texas Department of Housing and Community Affairs; EnviroTrans Solutions; the Texas Solar Energy Society; the Travis County Weatherization Program; Crescent Construction Company; and MetalOptics.

# Weatherization Plus: Opportunities for the 21<sup>st</sup> Century

The groundwork to support the evolution of DOE's Weatherization Assistance Program—called Weatherization *Plus*—has begun. The program already has helped more than 5 million low-income families reduce their heating and cooling costs through weatherization services. And now, with Weatherization *Plus*, the program's focus has expanded—from building envelope to mechanical measures, such as heating and cooling efficiency modifications—to include whole-house energy usage and whole-community efforts, providing low-income families with even greater benefits from energy cost savings.

The whole-house approach uses advanced technologies to address comprehensive energy usage in low-income homes, looking at the building envelope, mechanical systems, electric base-load (such as water heating and appliances), and indoor air quality, as well as the interaction of these components. Meanwhile, the whole-community approach encourages weatherization

A home is insulated as part of a DOE weatherization program.

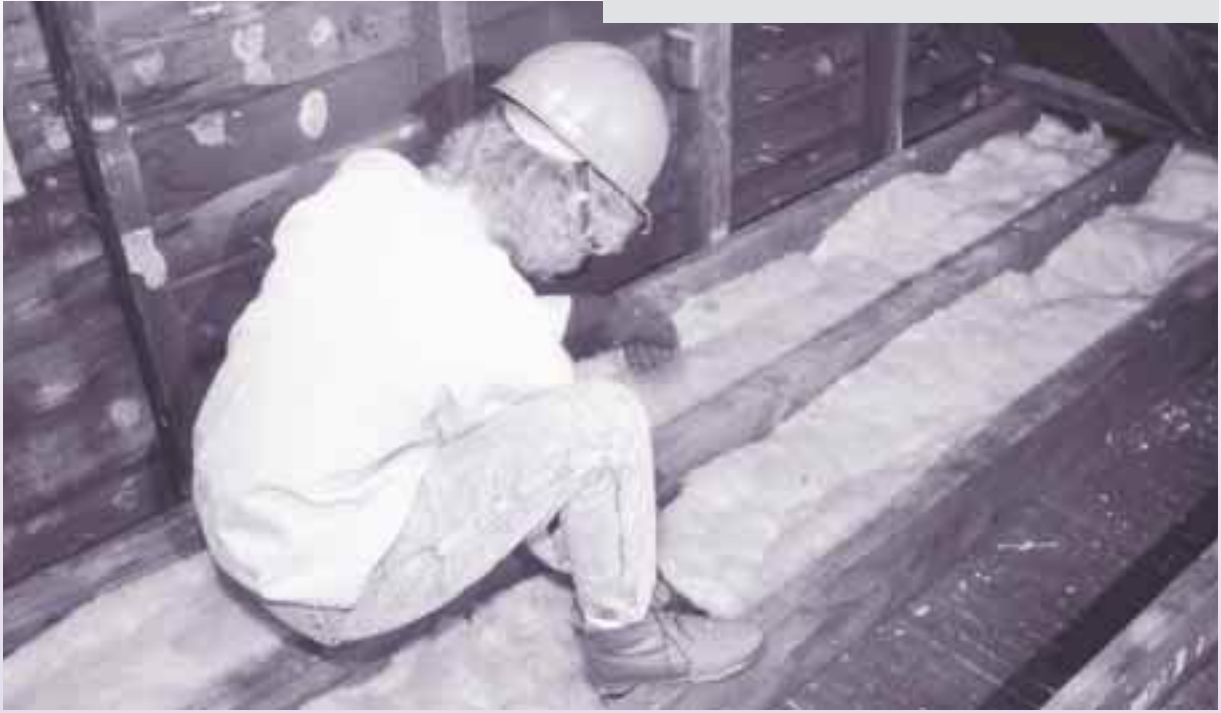


Photo by Karen Doherty

The blower door, a diagnostic tool, is often used in performing an energy audit.



Photo courtesy of The Energy Conservatory, Minneapolis, MN

providers to serve as a resource for community-based efforts to conserve energy, boost economic activity, improve the environment, and assist with lead poisoning risk assessment, disaster mitigation, and consumer education.

The Weatherization *Plus* concept helps DOE's well-established network of local weatherization providers to deliver the expanded services by increasing the network's flexibility through legislative and regulatory improvements, advancing the network's technological capabilities through training and technical assistance, and expanding resources available to the network through an information exchange.

The weatherization network has started to participate in larger national initiatives and collaborate more with other BTS programs. For instance, DOE

received \$200,000 from the U.S. Department of Housing and Urban Development and the Partnership for Advancing Technology in Housing to field test advanced duct-sealing technologies. A partnership with the Federal Emergency Management Agency will help low-income families prepare for and recover from disasters. A partnership with Rebuild America will provide opportunities for local weatherization agencies to participate in community-based, energy-efficient building projects. And a partnership with ENERGY STAR® will help bring more ENERGY STAR®-labeled products to low-income consumers nationwide.

For more information, visit the Weatherization Assistance Program Web site at [www.eren.doe.gov/buildings/weatherization\\_assistance/](http://www.eren.doe.gov/buildings/weatherization_assistance/).



# BTS Meetings, Events & Conference Calendar

Date	Meeting Event Conference	Contact
July 9-10	SERC-National Assoc. of Housing Redevelopment Officials New Orleans, LA	Diana Reeves 910-341-7700
July 10-13	National Workshop on State Building Energy Codes New Orleans, LA	Margo Appel 202-586-9495
July 17-20	State Energy Program All States Conference Burlington, VT	Joe Konrade 202-586-8039
July 20-22	Southeast Building Show Orlando, FL	Pat Love 865-574-4346
August 14-17	CERF International Symposium and Innovative Technology Trade Show Washington, DC	Christine von Steiger 703-706-8207
August 20-25	ACEEE Summer Study Pacific Grove, CA	Lani Macrae 202-586-9193
August 21-23	Energy 2000 Pittsburgh, PA	Dave Chaser 407-638-1453 www.energy2000.ee.doe.gov/
Sept. 6-9	COMFORTECH 2000 Atlanta, GA	800-567-0997 www.contractingbusiness.com
Sept. 13-14	18 <sup>th</sup> Annual AHMA San Diego, CA	303-840-9803 rockyahma@aol.com
Sept. 21-23	GlassTEXpo San Antonio, TX	540-720-5584 usglass@aol.com
Sept. 27-28	International Energy and Environmental Congress Milwaukee, WI	Karen Moon 770-279-4388
Sept. 29-30	Construction Training Show Las Vegas, NV	Larry Rice 802-244-9987

## Cooling Technologies Heat Up

Summer is coming, and temperatures are on the rise. In most parts of the country, peak energy use occurs in the hot summer months when we use air conditioners to keep our homes and businesses cool.

In addition to using a lot of energy, air conditioners use chlorofluorocarbons, which deplete the earth's ozone layer. BTS is developing new cooling technologies that both eliminate the need for CFCs and use less energy. Some of these technologies also improve indoor air quality and personal comfort.

Many commercial buildings, which rely on chillers for air conditioning, can now use a new technology called *cool storage* (or thermal storage). In cool storage, a chiller runs during the night to generate ice or some other material, such as salts that can save large amounts of energy. During peak cooling hours, the cool material supplements the chiller. This lowers the building's electrical load during peak hours and extends the life of the chiller by operating it at a steady load.

In the past, *evaporative cooling* worked effectively only in hot, dry climates. But the addition of desiccants (drying agents) to dry and heat the incoming air extends the use of evaporative cooling in commercial buildings to other climates. For the desiccant to keep working, it must be dried out by passing hot, dry air through it. Warm exhaust air from the building is further heated and then passed through the desiccant. Despite the energy needed to regenerate the desiccant, desiccant cooling technologies are significantly more energy efficient than chillers. Desiccants can also dry out the air used by conventional air conditioners, eliminating the need to both dehumidify and cool the air, and saving energy. The use of desiccants also improves indoor air quality by controlling humidity conditions.

*Gas-fired heat pumps* can replace natural-gas furnaces in homes and commercial buildings, saving consumers an estimated 20 to 40 percent on heating and cooling bills. The heat pumps used today are electrically driven and, when in cooling mode, operate on the same principle as vapor-compression refrigerators: heat in the inside air is moved to the outside. A reversible valve allows the heat pump to switch between heating and cooling modes. The advantage is that it delivers more output energy than input energy. In engineering terms, its coefficient of performance (COP) is greater than 1. The COP for the best combustion furnaces is only about 0.95 because of thermodynamic losses.

BTS is working with industry partners to bring these cooling technologies to the marketplace, so that staying cool and protecting the environment can go hand in hand.

DOE works with industry to make advanced cooling technologies more marketable, including these desiccant systems.



Photo by Warren Gretz, NREL

## BTS Provides Online Software Directory

Visit the BTS Building Energy Software Tools Web site at [www.eren.doe.gov/buildings/tools\\_directory/](http://www.eren.doe.gov/buildings/tools_directory/), and you'll find information on more than 190 software tools for buildings with an emphasis on renewable energy, energy efficiency and sustainability. Many of the software tools are free.

BTS designed the site to help you find the best software for your energy-related building needs. The software tools—from research grade to commercial products—include databases, spreadsheets, whole-building energy performance simulation programs, and component and system analyses.

The information for each tool listed on the site includes a description of the software, expertise required, number of users, audience, input required, output, computer platform, programming language used, its strengths, its weaknesses, who to contact for more information, and cost and purchase information.

You can also use the Web site's search feature or alphabetical listing to locate information on a specific software tool. You can even quickly find out which software tools are available for PCs, Macintosh, UNIX and for use with a Web browser.

During 1999, the Web site averaged more than 2,600 visitors per month. If you visit the site, e-mail the Webmaster to let us know if you have any suggestions to help us better serve your needs.

### Credits

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The Buildings for the 21st Century newsletter is published quarterly by the Office of Building Technology, State and Community Programs of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy.  
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